

ERIC Document Resume		See Instruction Sheet		DATE OF RESUME 6/18/65		DATE RECEIVED	
A. PUBLICATION DATA							
ED0000069		ORIGINATOR CONTROL NO. 7497		IDENTIFICATION NO. N.A.		DO NOT WRITE IN SPACE BELOW	
4. AUTHOR(S): Boi, James D.				MICROFILM COPY AVAILABLE YES ☒ NO ☐			
5. TITLE OF DOCUMENT ABSTRACTED: The Analysis of Class Size, Teaching Load, and Instructional Salary Costs				COPYRIGHT GRANTED YES ☒ NO ☐			
6. PUBLICATION TITLE: College Self Study, Chapter XI				COPYRIGHT RELEASE FILED YES ☒ NO ☐			
7. EDITOR(S): N.A.		8. PLACE OF ORIGIN		TYPE OF REPORT			
9. PUBLISHER OR SOURCE Western Interstate Commission for Higher Education		ORG. WICHE ST. Fleming Law Bldg. CITY Univ. of Colo. TELE. Boulder, Colo. INST/LOC CODE		PROPOSAL ☐ IN-PROGRESS ☐ FINAL ☒ FOLLOW-UP ☐			
10. VOL. N.A.	11. PAGES 183-198	12. MO./YR. 59	13. TOTAL PP. 16	OTHER ERIC REFERENCES:		ERIC SATELLITE CODE	
B. INDEXING DATA							
14. SUBJECT AREA				15. TYPE OF ENDEAVOR self-study			
16. INDEXING TERMS (6-12)							
class size		salaries		finance			
teaching loads		measurement					
teachers		expenditures					
17. ABSTRACT (MAX. 250 WORDS)							
In this article, the author points out that studies on faculty workload usually fall into two categories—those dealing with the "total service load," and those confined to "teaching (or instructional) load," narrowly defined. He further indicates that studies of instructional costs can be classified, in general, into two categories—those that are limited only to salaries paid persons who actually taught a class or classes during a given term or year and those that attempt to include not only salaries for teaching but also expenditures for instructional supplies, faculty benefits, secretarial and clerical services for faculty, and other items directly related to the function of instruction. The major portion of the discussion by Doi deals with the analysis of instructional salary costs on the basis of teaching load. A companion article, dealing with total instructional costs on the basis of an analysis of total faculty work load, by Raymond W. Kettler, is listed in this volume under item 7406. Forms, instructions, and illustrative tabulations for the analysis of class size, teaching load, and instructional costs appear in appendix A of <i>College Self Study</i>.							
18. SOURCE OF ABSTRACT							
C. FUNDING DATA							
19. SUPPORTING ORGANIZATION				20. DIVISION OR DEPT.		21. CONTRACT NO.	
				22. TOTAL COST OF PROJECT		PROJECT NO.	
				23. DURATION OR PROJECT		U.S. Department of Health, Education, and Welfare Office of Education	

College Self Study
WICHE

U. S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
Office of Education

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XI. The Analysis of Class Size, Teaching Load and Instructional Salary Costs

. James I. Doi

The topic for discussion today deals with one of the oldest concerns of the teacher. It stems from the fact that a person, in order to be a teacher, must have students. A man may possess knowledge--knowledge about many things in general or much about some small aspect of life or his environment. But from ancient times it has been recognized that the distinguishing mark of a teacher is that he has students or disciples--persons who are willing to come to him and learn from him. In our day this definition still holds--even though many students sit before their teachers because the law requires them to or because a course is required.

Although the terms "course offerings," "class size," "teaching loads," and "instructional costs" may not occur in the writings of ancient teachers and descriptions of their activities, one can find numerous references to such matters as the number of disciples who gathered about a great teacher on a given occasion (which in today's parlance we might call a class), the subject matter of his discourse (which we would call a course), and admonitions to the effect that no teacher, no matter how great, should attempt to lecture on every subject known to man (which today we would refer to as scope of subject-matter covered by a faculty member).

Certainly the teacher in the Medieval universities was much concerned about the size of his classes since his pay was usually related to the number of students who came to him. You will recall the origin of the pocket-like fold of the hood--that part of the formal academic attire worn by faculty members during academic ceremonies. This pocket-like fold hangs behind the wearer. During Medieval times, the Master collected his fees directly from his student; the pocket-like fold was to permit his students to reward the Master for his services in such a manner as to avoid the embarrassment of direct hand to hand transfer of money.

Because this concern with class size and teaching load has been with the teacher for such a long time, I wish it were possible to say to you today that modern institutional research has solved all the problems and we can present you with all the answers. I have no such message to give you.

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What I have to discuss deals mainly with how wise presidents, wise deans, and wise faculty members might go about gathering and analyzing data that can help them effect greater economy and efficiency in the management of instructional programs. I stress wise presidents, wise deans, and wise faculty members because no set of data, however detailed and conscientiously gathered and tabulated, can replace the element of good judgment. Institutional research, as you should have already surmised by now, is not a panacea for the assorted ills of higher education.

Uses of Faculty Work Load and Instructional Cost Studies

Of what use are studies of faculty work load and instructional costs to those concerned with the conduct of the instructional program? Such studies can serve the following purposes:

1. To provide information that will assist faculty groups and administrative officers in assessing the general efficiency and economy of the instructional programs. The same information can also be used to answer questions pertaining to the conduct of instructional programs raised by regents, legislators, and others concerned with the support of higher education.
2. To provide information that will assist in the development of objective criteria of instructional loads and staffing needs. A favorite pastime of faculty members is to compare teaching loads, the general thesis being that they are terribly overloaded, that classes are too large, and that there are too many classes to teach. The use of data can help put this kind of faculty talk on a more objective basis, freeing department heads and deans of endless hours of debate as to whether or not a particular department is understaffed or whether or not a particular faculty member has a heavier teaching assignment than certain of his colleagues.
3. To stimulate experimentation with instructional techniques and various class sizes. It is not unusual for faculty members to get into a rut and teach their classes by the same methods and by the same size groups year after year. The thought that they might even lighten their teaching loads by more efficient scheduling of courses and class sections may not occur to them, or if such a thought does occur to them, they don't quite know exactly how to approach the problem. In the hands of imaginative deans and department heads, faculty work load data can stimulate such groups into action and pave the way for experimentation with more efficient forms of instruction and utilization of faculty manpower.
4. To provide information for the planning of future expansion and changes in instructional programs and in plant facilities. Especially useful for this purpose are data showing the distribution of teaching loads and student credit hours at the undergraduate and graduate levels

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and among various subject fields. When gathered over a period of successive years, such data come to have added significance.

It should be noted that no mention has been made of the relevance of these data to the quality of instructional programs or to the nature of interaction between teacher and student in a classroom. These are certainly proper subject matter for institutional research, but the kinds of analysis which constitute the topic of this discussion do not directly measure either quality of instruction or the nature of teacher-student interaction.

Basic Types of Faculty Work Load and Instructional Cost Studies

Studies of faculty work load generally fall into two categories-- (a) those that deal with "total service load" and (b) those confined to "teaching (or instructional) load," narrowly defined.

In practically all institutions of higher education, faculty members do a great deal more than prepare for and meet classes. They devote their time and energies to research, student counseling, departmental and institutional administrative affairs, community and public service, professional organizations, in addition to class instruction. It is in studies of "total service load" that an attempt is made to take into account all of these activities. In a study of "total service load" of the faculty of the University of Colorado, made several years ago, it was found that, on the average, faculty members devoted 60 per cent of their time to teaching duties, which included time spent on preparation for class work and in classrooms, and 40 per cent to more than half a dozen other functions.

Studies of "teaching (or instructional) load" are generally confined to certain measurable aspects of class instruction, such as credit hours of classes taught, student-credit-hours taught, or number of class contact hours. Time devoted to the preparation of classes is rarely included in studies of "teaching load." It is for this reason that I used the term "narrowly defined" to describe this type of load study.

Another important distinction between studies of "total service load" and of "teaching load" is that the "total service load" study necessitates a questionnaire to individual faculty members, in which they are asked how many hours, on the average, each working week they spent on class preparation, class meetings, committee assignments, and various other activities. The "teaching load" type of study is based on data that are, in reasonably well-managed institutions, a matter of record in the office of the registrar or in the office of the dean of faculty. Because the required data are readily available, studies of "teaching load" can be made more frequently and with less wear and tear on faculty members.

Studies of instructional costs can also be classified into two categories--(a) those that are limited only to salaries paid persons who actually taught a class or classes during a given term or year; and (b) those that attempt to take into account not only salaries for teaching but also expenditures for instructional supplies, faculty benefits, secretarial and clerical services for faculty members, and for other items directly related to the function of instruction. Studies in the first category include only one kind of expenditures, salaries for teaching. For this reason they are frequently described as studies of "instructional salary costs."

Studies in the second category tend to vary somewhat in the kinds of expenditures included or excluded. These variations usually reflect differences of opinion among college and university budget officers as to the kinds of expenditure items that properly belong in the budget for an instructional department. For example, the costs of retirement provisions at some institutions are either prorated or charged directly to each department of instruction; at other institutions, they are classified as a general institutional expense. As another example, funds for faculty travel at some institutions are prorated or charged to each department of instruction; at others, they are classified as a form of administrative expense.

Studies of instructional costs should be distinguished from studies of total expenditures for educational and general purposes. The latter type of study includes expenditures not only for instruction, but also for administrative purposes, general institutional purposes, libraries and museums, plant operation and maintenance, organized research, general extension, and organized activities related to instruction. Occasionally one finds a study in which two categories of instructional costs are used--"direct costs" and "indirect costs." The "indirect costs" usually consist of expenditures for such functions as administration, plant operation and maintenance, libraries, etc., prorated to each instructional department by some formula.

In describing the major types of studies of faculty load and instructional costs, I have avoided categorizing one type of study as being superior or more useful than another. The truth of the matter is that each of the major types of studies mentioned yields different kinds of measures of load and costs and, thus, each contributes to a more complete understanding of an institution. Institutions should study both "teaching load" and "total service load," in order to obtain as complete a picture as possible of the utilization of faculty manpower; and it should make studies of instructional salary costs, of all instructional costs, and of educational and general expenditures, in order to determine the costs of various programs and functions and to devise ways and means of making the best use of available funds.

THE ANALYSIS OF TEACHING LOAD AND INSTRUCTIONAL SALARY COSTS

The remainder of this discussion will deal with the terms and techniques involved in a particular type of study of teaching loads (narrowly defined) and instructional salary costs. A chief architect of this type of analysis is Dr. John Dale Russell who, over a period of many years developed, or helped develop, many of the concepts and techniques involved. Some of you are undoubtedly familiar with the recent Russell reports on instructional programs for the New Mexico and Michigan institutions of higher education. Much the same techniques were applied in the analyses of instructional programs for the 1956 study of higher education in Florida, the 1955 restudy of the needs of California higher education, the current study of Texas higher education by the Texas Commission on Higher Education, the 1958 Homer Durham study of Montana higher education, and the study of Colorado colleges and universities. The analyses of instructional programs made for the institutions of higher education in these states are mentioned because the resulting data were published. Institutions in a number of other states have made similar analyses, but, for the most part, the results have not been made available to persons outside of the institutions, except on a personal and confidential basis.

Some forms used in collecting the required data are in Appendix A of this volume. Included with these forms is a set of instructions. These forms are being used for the study of class size, teaching loads, and instructional salary costs, for the academic year 1958-59, by the Colorado state-supported institutions of higher education. They are very similar to those used by Dr. Russell in his studies of the New Mexico and the Michigan institutions. The forms, especially the worksheets illustrating how to classify and tabulate the data, are intended for manual processing of data. The entire analysis can also be done by machine.

The following section on definition of terms has been reproduced from an unpublished study of instructional programs for New York University, made recently by Dr. John Dale Russell. This particular set of definitions is not only the most recent but the most comprehensive, and I have asked him to share it with us. I do recommend, however, that you examine his published study entitled Instructional Programs in Michigan Institutions of Higher Education, Staff Study No. 6, of the Michigan Survey of Higher Education, which also contains a thorough statement of the terms and procedures involved in the particular type of instructional program analysis under discussion here.

For reasons which require little explanation, I have omitted from Dr. Russell's statement specific references to New York University. I have also added an occasional remark, and these can be readily identified.

The terms fall into four broad categories: (I) certain unit measures that are used in reporting the instructional program; (II) basic factors that are used in the classification of the data; (III) program factors that are used to give a quantitative expression to the instructional service of the institution; and (IV) terms that reflect relationships between the various program factors.

I. Unit Measures Used

1. The course is an area of subject-matter, always identified by a descriptive title and usually identified by a distinctive course number and departmental designation. It may be presumed that, except as otherwise noted, every course comprises a unique configuration of subject-matter and has a minimum of overlapping of content with other courses. Sometimes a course is given double numbering, with respect to departmental classification, to show that it may be applicable to the interests of students in two departments rather than one. Thus the course "Classics 3, The Art of the Greeks" may carry the catalog notation "Course identical with Fine Arts 3." The published catalog usually provides a brief description of the content of each course, in addition to its title, department, and number. In the present analysis, courses that carry numbers or other cross-referencing in more than one department are classified only in the one department in which their listing is considered to be primary.

2. A class is a group of students meeting at the same time and place under an instructor for the pursuit of a course. The "class" differs from the "course" in that the "class" is a grouping of persons while the "course" is an organization of subject-matter around some central theme or topic. A course may be given in several duplicate sections, with class groups meeting at different hours during the day and on different days of the week and under different instructors. Each such duplicate section of a course constitutes a separate class for the purposes of the present analysis.

3. The credit-hour is the measure used to indicate the extent of the content of a course. The credit-hour is also one of the measures used to express the quantitative requirements for a degree. Each class is assigned the same credit-hour value as that of the course for which the class is given. A course is normally given for a fixed number of credit-hours or points, though the credit-hour value of a given course may be changed from time to time. Courses vary in their credit-hour values. The great majority of the courses carry 2, 3, or 4 credits, but there are some one-credit courses and a number that carry more than 4 credits. Because of this variation in the credit-hour value of courses, the course itself cannot be used for a precise count of the extent of the subject-matter offerings, so the credit-hour must be used for this purpose.

Classes of the recitation and lecture type usually carry as many credit-hours or points as the number of hours of class meetings during

one week of a semester. Courses of the laboratory or shop type usually meet for two or more hours each week for a semester, for each credit-hour carried. It should be noted that in the present study no measure is used to report "contact hours" (the number of hours the instructor devotes to class meetings of all types per week). All tabulations in this study are in terms of "credit-hours" and not in terms of "contact hours."

The "credit-hour" must always be designated as to whether it is a "semester" hour (in institutions operating on a semester basis) or a "quarter" hour (in institutions operating on a three-term or quarter basis during the academic year). Quarter-hours may be converted to semester-hours by using the formula: three quarter-hours equal two semester-hours.

4. The student-credit-hour is a measure of instructional production. The unit is one student in a one-credit-hour course. Thus a three-credit-hour course with 30 students enrolled produces 90 student-credit-hours.

5. The full-time-equivalent member of the instructional staff is the measure used to indicate the effort put into the instructional program by the faculty. For the purposes of this study, "faculty member" or "member of the instructional staff" means someone who has primary responsibility for the teaching of one or more classes. The test is the submission of the grade-report for the class; anyone who submits a grade-report is considered a "member of the instructional staff" in this study. The unit used in counting this item is defined as a member of the University faculty on a full-time basis whose only specifically assigned duties are the teaching of classes and the other activities of a regular member of the faculty that are normally associated with the teaching function. Persons who are part-time members of the university staff are included at the appropriate percentage of their full time. Members of the full-time faculty who are definitely assigned for part of their time to other duties, such as research projects or general university administration, are also counted at the proper percentage of full-time. The official budget of the university was used as a basis for determining the percentage of full-time that should be assigned to each staff member who is not on full-time teaching service. Assignment of duties as head of a department was not considered as a subtraction from full-time instructional service, inasmuch as this is a necessary and direct part of the instructional function itself.

6. Salary expenditures for instructional staff members are expressed in dollars of salary for the nine-months academic year or such part of that year as the faculty member may have served. The figures for salaries are taken directly from the budgets. The full-time salary of a member of the university staff who devoted only a part of his time to instruction is fractioned in accordance with the percentage of full-time that the staff member devoted to instruction, and that portion of his salary is assigned as the salary for his instructional

service. For example, if the budget indicated that a given faculty member was to devote one-third of his time to research and two-thirds to instruction, then two-thirds of his salary was considered as the salary expenditure for instructional service. In the case of personnel who give only part of their time to university service, i.e., those who are employed to teach one or two courses, the indication in the budget or the appointment records was followed if there was any notation regarding the fraction of full-time service that was appropriate; if there was no such indication, the person was arbitrarily assigned that percentage of full-time represented by the percentage that the number of his credit-hours of teaching was of the normal number of credit-hours taught by a full-time instructor in the School or College in which his service was rendered.

In the following section, Dr. Russell discusses six factors that can be used for the classification of instructional program data. These factors are especially pertinent to the analysis of instructional programs of a complex, university-type institution. It should be noted that in studies involving two or more institutions, we ordinarily use only two of the six factors--subject-matter classification and academic level.

II. Basic Factors for Classification of Data

7. The School or College is the basic organizational unit of the university, and the major budgetary unit within the academic program. All the data of this study are classified in accordance with the School or College primarily responsible for the offering of the courses. Courses that are listed in two or more School or College catalogs are assigned to the unit that is indicated as having the primary responsibility. Faculty time and salaries are assigned according to the School or College responsible for the course or courses taught. In practically all cases, the budgetary assignment of the instructor to a School or College is the same as that of the courses he teaches. In the case of a faculty member teaching in two different Schools or Colleges, his time and salary are fractioned in accordance with the budget, and if there is no indication in the budget, the fractioning is done in accordance with the credit-hours of class teaching in each School or College.

8. The department is a sub-unit of organization within the School or College. The analysis in this study follows the organizational pattern in each of the several Schools and Colleges. Each of the Schools and Colleges has its own unique pattern of departmental organization, and the patterns are by no means identical even in the several Schools or Colleges that deal with the same broad classification of subject matter, such as the liberal arts.

9. The subject-matter classification of each course refers to the specific field of content into which the course seems to fall, regardless of the School or College or department in which it is given. This classification attempts to put together the courses that seem to belong to the same subject-matter family, though possibly taught in different Schools or Colleges and in different departments.

The general policy, in the development of the list of subject-matter areas, was to set up units that would be comparable among the various Schools and Colleges. Each foreign language, for example, is considered as a separate subject-matter field, even though the departmental organization may group several different languages into one Department, such as the Department of Romance Languages. In the case of foreign languages, only courses taught in the language itself are classified under the subject-matter heading of the particular language; courses taught in English translation are classified as, e.g., English, or literature, or as classical civilization, depending on the nature of the course.

Because of differences between the subject-matter classification and the departmental structure, the courses of a given department may appear under more than one subject-matter head. Thus "statistics" is used as a subject-matter category, so courses on statistics that are taught in Departments of Mathematics, Education, Economics, Sociology, Government, or Industrial and Management Engineering, are not included under the subjects represented by the departmental names but under the classification labelled "statistics." This plan is used in order to permit comparisons between and among the various Schools and Colleges in which courses in a given subject-matter field may be offered.

10. The academic level of a course signifies the general maturity of the students for whom it is intended. Throughout the country it has been customary to recognize three different academic levels: (1) the first two college years, or the "lower division" of the undergraduate program; (2) the second two years, or the "upper division" of the undergraduate program; and (3) the graduate program.

As in other comparable studies of this sort, the classification of courses on the graduate level was rather strictly defined, to include courses normally open only to graduate students. All courses in Schools that have the word "Graduate" in their title--Graduate School of Arts and Sciences, Graduate School of Business Administration, and Graduate School of Public Administration and Social Service--were considered to be solely and strictly of graduate level. All courses in the Law School were also classified as strictly graduate level.

11. The tenure status of the members of the instructional staff was also used as a basic factor in the classification of the data of this study. Each member of the instructional staff was classified as "tenure" or "non-tenure." The data on tenure status were taken from the budget records. The data with respect to tenure status of faculty were analyzed only within the broad classification of School or College; further analysis by departmental sub-unit or by subject-matter area was not attempted in the tabulations, though such data could be tabulated from the available punched cards if needed.

12. The academic rank of the member of the instructional staff was entered on the punched card for each class, but no tabulations have been made on this factor.

III. Program Factors

Six types of statistical data are used in the present study to describe the instructional programs in the various Schools and Colleges, departments, subject-matter fields, and academic levels. Each of these will be defined in the paragraphs that follow.

13. The number of credit-hours of different courses offered is a measure of the scope of the program of instruction that is made available. Each course with an individual title and course number is counted as a separate course, and summations of the "different courses" are expressed in terms of the number of credit-hours for which each was given. Each course in such a tabulation is counted only once, no matter how many times during the year it was given or how many sections of the course were taught each semester. Two separate counts were made of the credit-hours of different courses offered; one based on the catalog listings of courses and the other based on the Registrar's list of courses actually taught. The difference between these two counts indicates the extent to which the catalog "over-advertises" (or in some cases, under-advertises) the course offerings. The tabulations in the series that are headed "number of credit-hours of different courses actually taught" refer to the data taken from the Registrar's listings of classes taught.

In the computation of credit-hours of different courses offered, it is assumed that the courses in each School or College are "different" from all the courses in any other School or College. Thus the gross totals for the entire university are not adjusted to account for the fact that certain courses, which are probably very similar if not identical (for example, beginning foreign language or freshman English composition), are taught in various Schools or Colleges.

14. The number of credit-hours of classes taught is a measure of the "in-put" of instructional effort by the faculty. This measure differs from the preceding one, described in paragraph 13, in that in the former case the credit-value of the "course" is counted only once, regardless of the number of times the course was given during the year; while in the latter measure, credit-hours of classes taught, the count includes a separate credit-hour value for each class in which the course was taught during the year. Thus, the three-credit course in first-semester English composition for freshmen in a given School or College counts only as 3 in the tabulation of different courses offered; but if twenty sections of this one course are maintained during the year, the count would be 3 times 20, or 60 credit-hours of classes taught.

15. The number of student-credit-hours produced is the sum of the products of the number of students in each class times the number of

credits for which the class is given. Thus, a class of 35 students in a three-credit course and a class of 40 students in a four-credit course together produce 265 student-credit-hours ($35 \times 3 + 40 \times 4$). The number of student-credit-hours is the best single statistical measure for describing the "out-put" or the "production" of the instructional program.

16. The number of full-time-equivalent members of the instructional staff is the sum of the percentages of full-time devoted to a particular unit or area by the faculty members teaching in that unit or area. As indicated earlier, this factor measures the "in-put" of instructional effort. In some of the smaller categories in which the data of this study are reported, the number of full-time-equivalent members of the instructional staff is less than one, because faculty members may divide their time between different academic levels or different subject-matter areas or different departments. In all cases in which the number of full-time faculty members is less than one the data based on that measure must be interpreted cautiously.

17. The total expenditures for salaries of members of the instructional staff is the sum of the dollar amounts of instructional salaries allocated to the particular School or College, department, subject-matter area, or academic level.

18. The number of credit-hours of classes taught in small classes has been tabulated for each subject-matter category, and each academic level. Two categories of "smallness" have been used: (1) classes with fewer than 5 students (i.e., with 4 or fewer students enrolled); (2) classes with fewer than 10 students (i.e., with 9 or fewer students enrolled). The grouping of classes with fewer than 10 students includes the classes with fewer than 5 students. In each case the count is in terms of the number of credit hours for which the small classes are given.

IV. Relations between Program Factors

In order to make comparisons between the gross amounts shown for each of the program factors among the various Schools and Colleges, departments, subject-matter areas, academic levels, etc., it is necessary to reduce the gross amounts to common denominators by an analysis that involves certain inter-relations of program factors. Some seven of these inter-relationships have been calculated and are reported in the present study.

19. The weighted average size of classes taught shows the average number of students in classes, as reported by the Registrar, for each grouping in which the program is analyzed. The average is "weighted" by the number of credit-hours each course carries. For example, to take a simple illustration, if in a particular classification there is a one-credit course enrolling 60 students and a five-credit course enrolling 6 students, the unweighted average size of the two classes would be $60 + 6 \div 2$, or 33, but the weighted average size of the two classes would be $(60 \times 1) + (6 \times 5) \div 1 + 5$, or 15. As can be noted from

the example here used, the weighted average size of class can be derived by dividing the total number of student-credit-hours produced by the total number of credit-hours of classes taught (item 15 in the preceding section divided by item 14).

20. The percentage of classes that are small relates the number of small classes to the total size of the instructional program, by dividing the number of credit-hours of classes that are small by the total number of credit-hours of classes taught (item 18 in the preceding section divided by item 14, the quotient being multiplied by 100 to convert to percentage). The percentage of classes that are small is shown for both the classes enrolling fewer than 5 students and for those enrolling fewer than 10 students.

The data on percentage of classes that are small should be a useful starting point for a review of the instructional program in the interest of improving its efficiency. Often the maintenance of too many small classes, especially at the undergraduate level, is associated with an over-expanded scope of course offerings, as reflected in the data on number of credit-hours of different courses taught. The maintenance of some small classes is less objectionable if accompanied by a relatively large average size of class than it is if the average size of class is also small. In general, the continued maintenance of a course in which the classes are small, year after year, needs to be justified in terms of some special contribution that the course makes to the curriculum or the services of the university.

21. Student-credit-hours produced per full-time-equivalent member of the instructional staff, for any grouping of courses, is obtained by dividing the total number of student-credit-hours produced by the number of full-time-equivalent members of the instructional staff (item 15 divided by item 16). This measure relates "in-put" to "out-put" and is therefore probably the best single index of the efficiency of the instructional program.

22. The average credit-hours of teaching per full-time-equivalent member of the instructional staff for any grouping of courses is obtained by dividing the "total number of credit-hours of classes taught" by "the number of full-time-equivalent members of the instructional staff" (item 14 divided by item 16). It should be noted that the measure deals with credit-hours of classes taught per academic year (two semesters) by the instructor, rather than with contact hours, or the number of hours the instructor met classes. Thus the measure does not give any different recognition to recitation-type courses and laboratory-type courses, though in the latter type of course the instructor may spend two or more hours with the class for each hour of credit the course carries. Nor does this measure give recognition to the fact that in certain graduate-level programs the instructor in a three-credit course meets the class for only two hours per week.

In general, it is considered wise academic administration to keep the number of credit-hours of teaching as low as possible, so that faculty members may have the maximum opportunity for scholarly activities other than class teaching. When this principle is combined with the one suggested in the preceding paragraph, it appears that a well administered and efficient academic program tends to keep the average credit-hours of teaching per faculty member low and the average student-credit-hours produced per faculty member high. The attainment of these goals is made possible by keeping the average size of classes relatively large. Thus, a given total instructional burden, say 12,000 student-credit-hours, could be carried by 20 full-time-equivalent faculty members teaching an average of 24 credit-hours per year with an average size of class of 25; the same number of faculty members could carry this same instructional burden by teaching an average of 20 credit-hours a year with an average size of class of 30.

23. The average instructional salary expenditure per full-time-equivalent member of the instructional staff is obtained by dividing "the total instructional salary expenditures" by "the number of full-time-equivalent members of the instructional staff" (item 17 divided by item 16). This average indicates the extent to which the faculty members receive salary compensation for their instructional services. By and large, this is probably one of the best measures available to indicate the quality of an instructional program. It may be presumed that there is a wise administration of the available funds to obtain the best possible instructional personnel for the levels of salary that can be offered, so the higher the average salary the better the quality of the instructional staff.

It can readily be shown, by simple arithmetic, that with a given amount of money for instructional salaries and a given number of student-credit-hours produced, the average faculty salary varies directly with the number of student-credit-hours produced per member of the instructional staff. If, in the illustration used in the preceding paragraph, there is a faculty salary budget of \$132,000 to support the instructional program in which 12,000 student-credit-hours are produced, and if 20 full-time-equivalent faculty members are employed for this service, the average student-credit-hour production would be 600 per faculty member and the average salary would be \$6,600. If, on the one hand, the average student-credit-hour production could be pushed up to 750 per full-time-equivalent instructor, only 16 instructors would be required and the average faculty salary could be \$8,250. If, on the other hand, the student-credit-hour production is only 480 per full-time-equivalent faculty member, then 25 faculty members would have to be employed and the average salary could be only \$5,280.

In other words, in order to maintain a high average faculty salary (and therefore an instructional staff of high quality), it is desirable, under conditions of a limited budget for faculty salaries, to push up the average student-credit-hour production per member of the instructional staff. This is accomplished by avoiding the use of more faculty members

than are absolutely necessary to staff a satisfactory instructional program. There is no evidence, within the normally observed range of student-credit-hour production per member of the instructional staff, that any deterioration occurs in the quality of the instructional service as the number of student-credit-hours produced per faculty member increases.

24. The average instructional salary expenditure per student-credit-hours produced is obtained for any grouping of courses by dividing the total instructional salary expenditure by the number of student-credit-hours produced (item 17 divided by item 15). This is a very simple cost figure. It must be interpreted with caution because instructional salaries are by no means the total cost that devolves upon the university in the production of student-credit-hours. Care must also be taken when interpreting this cost figure, because it is a composite of the number of student-credit-hours produced per faculty member and the average salary per faculty member.

A high cost per-student-credit hour is commendable if it is caused by the utilization of a staff of excellent quality at high salaries. The opposite conclusion must be drawn if the high cost per student-credit-hour is primarily attributable to a low student-credit-hour production per faculty member.

Cost data similar to the one here defined are used in industry and commerce for two purposes: (1) to assist in determining the selling price of a product; and (2) to eliminate from the line of goods produced or services rendered those kinds of units or services that cannot be produced at a cost below the price at which they can be sold. Neither of these uses of the cost data is entirely applicable to an educational institution. In general it is not the policy of colleges and universities to fix their prices (i.e., fees charged students) for each course or group of courses in accordance with the cost of teaching each course. And in almost every college or university it is necessary, in the maintenance of a well rounded curriculum, to teach some courses that have a much higher cost of production than others. Caution must therefore be raised against the use of the data on instructional salary expenditure per student-credit-hour as a device for arbitrarily eliminating certain courses or curriculums from the academic program of the university. The data present one factor which might well be taken into account in such a decision, but the cost data alone should not be finally determinative.

25. The average instructional salary expenditure per credit-hour of classes taught is obtained for any grouping of courses by dividing the total expenditure for instructional salaries by the number of credit-hours of classes taught (item 17 divided by item 14). This measure may be interpreted as the average cost of maintaining a one-credit-hour class in the grouping of courses for which the data are presented....

Collecting the Data

In Appendix A you will find forms and instructions used by the state-supported institutions in Colorado for collecting data on class size, teaching load, and instructional salary costs.

It is important that department heads and others who complete these forms be given accurate and complete instructions and definitions so that comparable data will be obtained.

These forms and instructions can be adapted to the special needs and programs of most colleges and universities.

Analyzing the Data

Earlier in this paper there are a number of comments on the kinds of analyses that can be made of instructional salary cost data. The comments under "Program Factors" and "Relations Between Program Factors" (terms number 13 through 25, above) should suggest a number of ways of analyzing these data.

And, for illustrative purposes, we have reproduced in Appendix A a number of tables of data on the New Mexico institutions of higher education.

These tables, together with Raymond Kettler's remarks in the following chapter, should provide you with a rather complete overview of the subject of instructional costs.

In conclusion, let me remind you that this paper has emphasized the analysis of instructional salary costs (not total instructional costs) on the basis of teaching load (not on the basis of total faculty work load). [In the following chapter, Mr. Kettler will discuss] the second type of analysis; namely, total instructional costs, on the basis of an analysis of total faculty work load. *is listed in the*

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